

In the Claims

1. (Currently Amended) A method for dewatering biological sludge that has been digested by a thermophilic digestion process at a temperature greater than about 115°F, comprising:

a. adding a polymeric quaternary ammonium compound, as primary component, to the biological sludge; and

b. adding a polyacrylamide to the biological sludge;

such that any combination of the polymeric quaternary ammonium compound and of the polyacrylamide enhances dewatering of the sludge.

2. (Previously Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is from the di-allyl di-methyl ammonium chloride (DADMAC) family.

3. (Previously Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is epichlorohydrin di-methyl amine (epi-DMA).

4. (Currently Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge ~~and, upon following the~~ formation of microflocs of the sludge from the addition of the polymeric quaternary ammonium compound, wherein the polyacrylamide is a cationic polyacrylamide ~~and is added to form a floc that dewater the sludge.~~

5. (Currently Amended) The method for dewatering biological sludge according to claim 4, wherein the polymeric quaternary ammonium compound and the cationic polyacrylamide are in an approximately 1:1 ratio, with the cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound ~~does.~~

6. (Previously Amended) The method for dewatering biological sludge according to claim 4, wherein ratio of the polymeric quaternary ammonium compound with respect to the cationic polyacrylamide ranges from about 1:10 to about 20:1.

7. (Previously Amended) The method for dewatering biological sludge according to claim 4, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

8. (Previously Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system, wherein the polyacrylamide is a anionic polyacrylamide added for final floc formation.

9. Cancelled

10. (Previously Amended) The method for dewatering biological sludge according to claim 8, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in an approximately 10:1 ratio, with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound.

11. (Original) The method for dewatering biological sludge according to claim 10, wherein the anionic polyacrylamide is about 40% anionic.

12. (Previously Amended) The method for dewatering biological sludge according to claim 8, wherein ratio of the polymeric quaternary ammonium compound to the anionic polyacrylamide ranges from about 1:10 to about 20:1.

13. (Previously Amended) The method for dewatering biological sludge according to claim 8, wherein polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

14. (Original) The method for dewatering biological sludge according to claim 1, wherein the biological sludge is mixed with primary sludge.

15. (Currently Amended) A composition comprising biological sludge according to claim 1, that has been digested by a thermophilic digestion process ~~at a temperature greater than about 115°F~~, comprising polymeric quaternary ammonium compound, as primary component, and polyacrylamide, said components being present in the composition in a ratio to enable dewatering of the biological sludge.

16. (Currently Amended) The method for dewatering biological sludge according to claim 1, wherein ~~the polyacrylamide~~ and the polymeric quaternary ammonium compound is used in solution or in dry form.

17. Cancelled

18. Cancelled

19. (Previously Amended) The method of claim of claim 16 wherein the polyacrylamide is cationic or anionic.

20. (Previously Added) The composition of claim 15 wherein the polyacrylamide is cationic or anionic.

21. Cancelled

22. (Currently Amended) A method for treating a sludge comprising water and solids, wherein the solids comprise thermophiles, ~~wherein the thermophiles comprise bacteria living at a temperature greater than about 115°F~~; the method comprising:

contacting the sludge according to a technique selected from a group of techniques including; contacting with a polymeric quaternary ammonium compound and along with a polyacrylamide to form a treated sludge;

~~wherein the~~ and contacting ~~of the sludge with the polyacrylamide and polymeric quaternary ammonium compound is simultaneous, or the contracting of the sludge is first~~ with the polymeric quaternary ammonium compound and then with the polyacrylamide.

23. Cancelled.

24. (Previously Added) The method of claim 22, wherein the polymeric quaternary ammonium compound comprises a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

25. (Previously Added) The method of claim 22, wherein the polymeric quaternary ammonium compound is added in amount sufficient to form microflocs of the thermophiles; and wherein the polyacrylamide is added in amount sufficient to agglomerate the microflocs into flocs for dewatering.

26. (Previously Amended) The method of claim 25, wherein the polymeric quaternary ammonium compound comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

27. (Previously Added) The method of claim 25, wherein ratio of the polymeric quaternary ammonium compound to the cationic polyacrylamide is in the range of about 1:10 to about 20:1.

28. (Previously Amended) The method of claim 25, wherein a concentration of quaternary ammonium compound and polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

29. (Previously Added) The method of claim 22, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge, and wherein the anionic polyacrylamide is added for final floc formation.

30. (Previously Amended) The method of claim 29, wherein the polymeric quaternary ammonium compound comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

31. (Previously Added) The method of claim 29, wherein ratio of the polymeric quaternary ammonium compound to the cationic polyacrylamide is in the range of about 1:10 to about 20:1.

32. (Previously Amended) The method of claim 29, wherein total concentration of quaternary ammonium and polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

33. (Currently Amended) A method for treating a sludge comprising water and thermophiles, wherein the thermophiles comprise bacteria living at a temperature greater than about 115°F, the method comprising:

adding to the sludge a polymeric quaternary ammonium compound.

34. (Currently Amended) The method of claim 33, wherein the polymeric quaternary ammonium compound comprise a molecular weight in ~~the range~~ of greater than about 5,000,000.

35. (Previously Amended) The method of claim 33, wherein the polymer is added in an amount sufficient to form microflocs of the thermophiles.

36. (Previously Amended) The method of claim 35, wherein the quaternary ammonium comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

37. (Previously Amended) The method of claim 35, wherein a concentration of polymer to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

38. (Previously Amended) The method of claim 33, wherein the polymer is added in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge, and wherein the anionic polyacrylamide is added for final floc formation.

39. (Currently Amended) The method of claim 38, wherein the quaternary ammonium moiety comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

40. (Previously Amended) The method of claim 38, wherein a concentration of polymer to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

41. (Currently Amended) A sludge composition comprising:
water;
polyacrylamide;
a polymeric quaternary ammonium compound; and
solids comprising thermophiles, wherein the thermophiles comprise bacteria living at temperatures greater than about 115°F.

42. Cancelled

43. Cancelled

44. (Previously Amended) The sludge of claim 41, wherein the polymeric quaternary ammonium compound comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

45. (Previously Amended) The sludge of claim 41, wherein ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1.

46. (Previously Amended) The sludge of claim 41, wherein a concentration of quaternary ammonium compound and polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

47. (Previously Added) The sludge of claim 41, wherein the polymeric quaternary ammonium compound comprise a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

48. (Currently Amended) A sludge composition comprising:

water;
polyacrylamide;
a polymeric quaternary ammonium compound; and
solids comprising microflocs of thermophiles ~~wherein the thermophiles comprise bacteria living at temperatures greater than about 115°F.~~

49. Cancelled

50. Cancelled

51. (Previously Amended) The sludge of claim 48, wherein the polymeric quaternary ammonium compound comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

52. (Previously Amended) The sludge of claim 48, wherein a ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1.

53. (Previously Amended) The sludge of claim 48, wherein a concentration of quaternary ammonium compound and polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

54. (Previously Added) The sludge of claim 48, wherein the polymeric quaternary ammonium compound comprise a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

55. (Currently Amended) A sludge composition comprising:

water;

polyacrylamide;

a polymeric quaternary ammonium compound; and

solids comprising an agglomeration of microflocs of thermophiles ~~wherein the thermophiles comprise bacteria living at temperatures greater than about 115°F.~~

56. Cancelled

57. Cancelled

58. (Previously Amended) The sludge of claim 55, wherein the polymeric quaternary ammonium compound comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

59. (Previously Added) The sludge of claim 55, wherein a ratio of the polymeric quaternary ammonium compound to the cationic polyacrylamide is in the range of about 1:10 to about 20:1.

60. (Previously Amended) The sludge of claim 55, wherein a concentration of quaternary ammonium compound and polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

61. (Previously Added) The sludge of claim 55, wherein the polymeric quaternary ammonium compound comprise a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

62. - 66. Cancelled

67. (Currently Amended) A sludge composition comprising:

water;

thermophiles; ~~wherein the thermophiles comprise bacteria living at temperatures greater than about 115°F and~~

a polymeric quaternary ammonium compound.

68. (Currently Amended) The sludge of claim 67, wherein the quaternary ammonium ~~moity moiety~~ comprises at least one selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) compounds and epichlorohydrin di-methyl amine (epi-DMA).

69. (Previously Added) The sludge of claim 67, wherein the polymer is present in an amount sufficient to form microflocs of the thermophiles.

70. (Previously Added) The sludge of claim 67, wherein the polymer is present in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge.

71. (Currently Amended) The sludge of claim 67, wherein ~~wherein~~ the polymeric quaternary ammonium compound comprise a molecular weight in the range of at least about 5,000,000.